Syngenegraph Part 1

A new Perspective on the Purpose of Blockchain Technology in Creating a Safe, Secure, Circular & Sustainable Global Economy for Engineers, Creatives & Blue Collar Workers.

Patrick Mockridge, John Tominey, Raphaël Fabre & Loïc Sauce
Metcalfe Energy, Dappy.tech, Ecole Supérieure de Commerce et Marketing, Aberystwyth, Wales; Mexico City, Mexico; Toulouse, France & Paris, France.

Abstract

The CoVid-19 crisis represents a new opportunity to reshape out global value systems in accordance with our best available understanding or what prevents humanity from developing the necessary innovation to improve genuine quality of life. The networked systems of coordination of the 20th century, whether capitalist or socialist, were capital power structures. These structures depend upon mimetic desire, and therefore scapegoating, and sabotage in order to sustain them.

The advent of Bitcoin [58] and other blockchain solutions heralds a new vision of decentralised value networks, free from oligarchical and state control. However these networks still depend upon capitalist conceptions of money and finance and will continue to inherit the legacy problems associated with the value networks of the past if we do not build solutions which fundamentally take individual situational capital into consideration from the beginning. Decentralisation means not just decentralisation of finance but also decentralisation of how financial instruments are created from the situational capital of the individuals involved in creating them.

Decentralisation means not only decentralising the creation and transfer of money, but also decentralising the meaning of money according to the existential drivers and necessities of those involved in its creation from the work that they carry out. If we consider money to be the integral of all work and stake across a network accumulated via non-zero sum and zero sum games, we can attribute provenance to money in a way that is 10x more transparent and fair for those involved in earning it by giving up their time and their life.

The Problem and Solution Space

The CoVid-19 represents a crisis of the ability of our current systems of technocracy, from data security to finance to science and engineering to manufacturing and supply chains, to remain resilient and work in the interests of ordinary people in a sustainable way in the face of unforeseen events. Humanity requires value network architectures that are conceptually designed from the ground up to protect the situational capital of engineers, creatives and blue collar workers. These value networks should provide them with the necessary data and financial security to protect their income, their work and their professional reputations.

> *'According to the theory of capital as power, capitalism, like any other mode of power, is born through sabotage and lives in chains – and yet everywhere we look we see it grow and expand. What explains this apparent puzzle of 'growth in the midst of sabotage'? The answer, we argue, begins with the very meaning of 'growth'. Whereas conventional political economy equates the growth with a rising standard of living, we posit that much of this growth has nothing to do with livelihood as such: it represents not the improvement of wellbeing, but the expansion of sabotage itself.'* - Jonathan Nitzan and Shimshon Bichler [2]

In addition to this, Peter Thiel's Zero to One [1] shows that humanity is currently over-valuing horizontal mimetic growth and under-valuing genuine innovation. Our current value networks are structured such that innovators must risk their reputations and even their lives in order to produce the necessary vertical technological economic growth required and expected by institutions to solve the planet's existential problems. An over-reliance upon open source collaboration, a shortage of venture capital relative to total available capital and intellectual property laws that are prohibitively

expensive to enforce globally make it extremely difficult for the kinds of outsiders who produce novel technology to eventually capitalise upon it. If innovators are unable to capitalise the risk-reward profile of their pursuits becomes skewed towards becoming scapegoated by their peers and their community, as described by Rene Girard [47], the philosophical inspiration for Peter Thiel, which completely inverts the standard neoclassical description of how entrepreneurs should be rewarded.

> *'As we enter a unique window of opportunity to shape the recovery, this initiative will offer insights to help inform all those determining the future state of global relations, the direction of national economies, the priorities of societies, the nature of business models and the management of a global commons. Drawing from the vision and vast expertise of the leaders engaged across the Forum's communities, the Great Reset initiative has a set of dimensions to build a new social contract that honours the dignity of every human being*.' - The World Economic Forum [55]

Value networks of the future should, therefore, have a built in pathways for innovators to innovate safely and be able to capitalise upon their innovation. The Romeo-Juliet Diagram framework, developed by Patrick Mockridge [56] models vertical growth and the forces preventing vertical growth as a network penetration process calculus problem against the forces of Nitzan and Bichler's Cre-Order accumulation and stagflation [2] within the context of Daniel Robles' award winning work on blockchain technology for engineering professionals [6] [7] [8]. If vertical technological economic growth can only happen via a Zero to One path, then that path should be built into the system conceptually from the ground up. Rather than expecting innovators to navigate systems that work against their interests in addition to the associated personal and financial risks associated with any entrepreneurial venture, we need value systems for innovation that work how the Zero to One innovation pathway works.

Security and safety are the most crucial part of any process system. According to Major Accident Hazard legislation [53] risk mitigation against catastrophic risks should be built in conceptually from the beginning of the design process. Entering into a massively digitally interconnected Internet of Things paradigm means that this design mentality and culture of safety must apply to our digital network processes as well as our physical industrial processes. Humanity must learn the lessons of Siren Server [3] [50] and Surveillance Capitalism [59] economics, the European Debt Crisis, the 2008 Financial Crisis and subsequent bailout (encoded into the Bitcoin genesis code itself [52]) and now CoVid-19 in order to survive and thrive sustainably on planet Earth. Blockchain technology allows engineers to build networks with an ALARP mindset from the ground up, reducing the risk of any and all systemic catastrophic risk to 'As Low As Reasonably Practicable' [96] for the full expected lifetime of any digital network.

It is common knowledge within the physical process industries from chemicals to energy to manufacture that when risks are not mitigated conceptually from the beginning, then the risks will later scale with complexity. This culture of safety and social responsibility has, however, not crossed over into the digital process industries. Siren Servers, described by Jaron Lanier, [3] [50] started out as 'free at point of sale' services for their original customers: the users. Today they have morphed into mass surveillance systems [6] whereby the users are the raw material of an industrial process whereby the customer of the Siren Server buys the distilled predictive capacity generated by the users. This predictive capacity is then used to destabilise nations, target individuals and subvert democracy for profit, all of which is inherently dangerous.

The current systems of global value are controlled via the oligopolies of Big Finance and Big Tech creating one de facto global monopoly and bourgeois social hierarchy. This system is fragile and therefore paranoid leading to blanket mass surveillance and extensive sabotage via democratic subversion, war, international trade tariffs and embargoes and resource shortages and therefore poverty and starvation.

II. Socioeconomic Barriers to Innovation

In a recent paper, Bloom et al. (2020) [33] presented evidence from various industries, products, and firms suggesting that research productivity is declining, even though firms and public institutions keep on substantially investing in R&D. The sharp fall in research productivity and idea production have significant detrimental consequences for long-term growth and for the ability of firms and public institutions to provide innovative solutions to major contemporary issues, such as climate change.

As early as 1965, Thompson [46] pointed out that bureaucratic structures are conducive to loss of creativity. In line with this seminal paper, further research suggests that centralization and formalization, poor managerial attitude toward change, rigid organizational culture, rigidification of organizational

routines and strategies, risk-aversion, and administrative intensity are major impediment to innovation (see for example Hirst et al., 2011, Wan et al., 2005) [20] [30].

Organizational path dependence also narrows down the scope of alternative actions and lock organizations in specific technological trajectories, while "de-locking" entails large sunk costs (Schreyögg & Sydow, 2011, Sydow et al., 2017) [25] [27].

Along with these organizational dimensions, the decline in the productivity of research can also be explained by three complementary causes. First, applied and theoretical research by private firms and public institutions faces an agency problem where the principal and agents have diverging interests and asymmetric information that requires the costly design and implementation of efficient reward structures to increase the quantity and quality of innovative activities. Second, research and the production of ideas raise complex issues of intellectual property rights, with the classical dilemma between protection of innovators and diffusion of the innovation to other innovators and firms. Third, in line with the previous identification of bureaucracies as major impediments to innovativeness, research faces a public choice issue, where government and public agencies may have an interest in investing in research projects to maximize their power and prestige. This may lead to redundancy and duplication of resources between research programs and labs, waste of scarce human and financial resources, and malinvestment in scientific equipment.

1) Agency Problems

Following Jensen & Meckling (1976) [21], the Grossman-Hart principal-agent model (1983) [17] identifies moral hazard and opportunistic behavior as major sources of economic losses, agency costs, and inefficiencies for organizations (Hart, 1983) [18].
Economists developed numerous models since the early 1980s to devise consistent and efficient incentives contracting to mitigate moral hazard and align the interests of the agents and the principal (Mookherjee, 1984, Nalebuff & Stiglitz, 1983, Stiglitz, 1986) [22] [24] [26]. In their simplest forms, these models usually assume that a risk-neutral or risk-averse principal can observe the output of each agent and devise a performance index to assess for the relative performance of each agent of the organization. It is then argued that the principal can pick the optimal contracting scheme (rewards and penalties) among a set of alternative schemes.

These simple models usually suffer from several limits and inconsistencies. For example, they have difficulty to integrate the possibility of collusion between agents, the actual implementation of incentive schemes (or the move from one scheme to another), principal's performance evaluation of agents, the way agents adjust their behavior, or the fact that principals may have an interest to choose a sub-optimal scheme to maximize their own welfare.

Further difficulties arise if we assume that agents act on behalf of multiple principals, with new issues of inconsistent governance, duplication of monitoring, or coalition between principals. Even though more sophisticated models tackle these issues, the design of reward structures to innovative and research activities remain a central concern for contemporary economics research on the agency problem in organizations.

2) Intellectual Property Rights (IPR)

The dynamic interaction between intellectual property rights (IPR) and innovation gives birth to a simple dilemma. On the one hand, IPR provides incentives for innovators to invest in innovative activities and capture a higher share of the social returns to their research investments. IPR protection (such as patents and copyrights) thus provide a (temporary) technology-based leadership on competitors ("quasi-rent"), at the risk of monopolistic power detrimental to consumers.

On the other hand, full patent protection forces followers to imitate the same innovation to catch up to the leader. This involves that both leaders and followers redundantly invest scarce resources (time, efforts, funding) to obtain the same (or similar) innovation outcome. It is also argued that patenting may deter innovation (Heller & Eisenberg, 1998) [19].

Patenting knowledge from universities and the public sector raises additional problems since it is usually assumed that universities face different incentive schemes than firms in that they do not perform profit-maximizing innovation and R&D but receive funds to perform socially useful knowledge (Verspagen, 2006) [29].

Further difficulties arise when we consider the case of cumulative and sequential innovation where research output and product developments result from several previous steps of innovation and research. In this case, we must consider whether IPR in existing technologies hinders subsequent innovation.

If innovators face a perfect contracting environment with no transaction costs, they can negotiate an agreement to

allow for cumulative research (Bessen, 2004, Bessen & Maskin, 2009, Scotchmer, 1991, Williams, 2013) [13] [14]. However, transaction costs are ubiquitous in real-world institutional arrangements, making the licensing negotiations solution impracticable.

3) Public choice

The theory of "public choice" is at the intersection between economics and political science. It analyzes the incentives of public actors (e.g., politicians, bureaucracies, heads of public administration, judges, etc.) in nonmarket environments (Buchanan & Tullock, 1962, Mueller, 2003) [16]. The theory assumes that politicians and public officials are self-interested economic agents who act and choose among alternative rules to maximize their wealth, prestige, and power, often at the detriment of public interest. Corruption, dishonesty, bribe acceptance, alliances and logrolling are all conceived as rational responses of politicians and self-fulfilling equilibria.

A major claim of public choice is that policies and politicians discount the future in that they do not aim at creating and nursing long-term investment strategies, but at maximizing status, prestige, wealth, or probability of being reelected. Furthermore, it is in the interest of politicians to collude and create political coalitions that usually lead to decisions that do not maximize social welfare or are even irrespective of social interest altogether. For research and innovative activities, this may lead to competition between research labs and investment redundancy, waste of scarce human and financial resources, malinvestment in scientific equipment or investment in dubious large-scale projects.

4) Proof of Stake Blockchain Shards for Engineers and Scientists

Taken together, bureaucracies, centralization and formalization of procedures, poor managerial attitude toward change, rigid organizational culture, organizational routines and strategies, risk-aversion, path dependence, agency issues, IPR and public choice concerns are at the origin of an environment inappropriate for individual and team creativity.

Proof of Stake Blockchain Shards for Engineers and Scientists mitigate these barriers to innovation and creativity by providing engineers and researchers with a decentralized research lab and an open scientific crowdsourcing platform to coordinate human efforts and creativity at a scale beyond the reach of the classical organization of R&D departments and research labs. As a competency-based system, this enables a limitless number of participants from around the world and with diverse backgrounds to share knowledge and creatively solve theoretical and real-world problems. By coordinating and combining the creativity, efforts, and resources of an unlimited number of research teams and R&D departments, the platform would decrease the likelihood of redundancy and duplication of efforts and favor the discovery of dormant solutions to complex real-life problems, such as climate change.

III. Socioeconomic Barriers to Mass Adoption and Ownership of Automation

The size of the global market for both industrial and non-industrial robots reached $39 billion in 2017 and is estimated to be worth almost $500 billion by 2025 (source: Statista).

In manufacturing, robotics, machine learning and artificial intelligence are now pervasive in every industry and impact the international organization of production (DeBacker et al., 2018, West, 2018) [34] [43]. Worldwide sales of industrial robots are steadily growing over the last 15 years (Figure 2.1), while their average selling price remains a significant investment cost for firms, especially for small firms and start-ups (Figure 2.1).

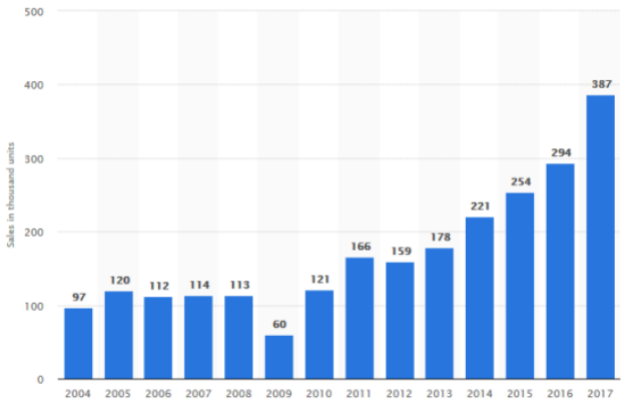

Figure 2.1: Worldwide robotics sales in terms of units shipped 2004-2017 (Source: Statistica)

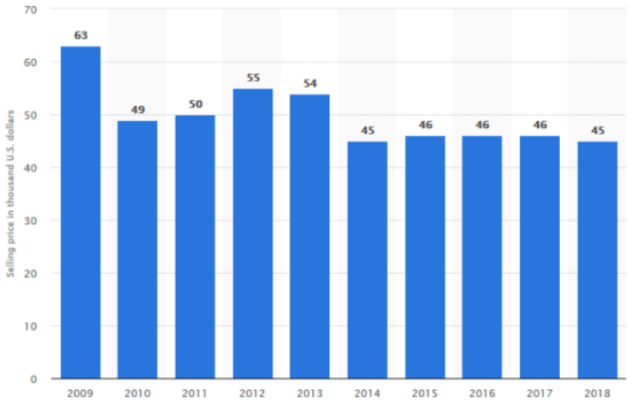

Figure 2.2: Average worldwide selling price of industrial robots 2009-2018 (Source: Statistica)

Numerous studies (e.g., OECD, 2016) point to a widespread fear that robots and automation will destroy low qualified and repetitive jobs (especially in manufacturing) by the coming decades. Concerns on civil liberty, security, privacy, reliability, safety, and regulation are also ubiquitous. On the other hand, other studies (e.g., Graetz & Michaels, 2017) [37] suggest that automation and robotics are not substitutes for human workers and do not threaten employment but that deploying robots (especially co-bots) in manufacturing significantly increases productivity and helps in creating jobs.

The robotics engineering industry is composed of two mutually exclusive groups of actors. On the one hand, a myriad of individual open source programmers who do not have the necessary time, infrastructure and resources to access the market. On the other hand, highly centralized conglomerates with large market power.

Because of this asymmetry of market power, the robotics engineering industry is characterized by a Schumpeterian Mark II pattern of "creative accumulation", where large incumbent firms create significant barriers to entry, such as capital requirements, R&D costs and unequal access to technology that prevent the entry of new entrepreneurs, robotics start-ups and small firms (Nelson & Winter, 1982, Kamien & Schwartz, 1982) [41] [39]. These inefficiencies entail several harmful consequences on welfare and creativity for all the stakeholders of the robotics industry.

For end-users: conglomerates earn above-normal profits and charge abnormally high prices for their services to end-users (Bain, 1956, Fee et al., 2004) [32] [35]. Be they firms or households, end-users' welfare is degraded. Consequently, conglomerates impede SMEs and small-scale production units to have access to cutting-edge technologies.

For competitors: conglomerates reduce contestability and competition. Yet, competition is the bedrock of innovation and creativity.

For engineers: neither engineers who work for these large companies, nor benevolent engineers reap the fruits of their efforts and creativity. Their IP is neither protected nor monetized.

At the macro-level: by slowing down the creation and diffusion of technology, this oligopolistic market structure is detrimental for total factor productivity and wealth creation and is at the origin of durable inequality across industries and countries.

Glocalisation and Metcalfe Energy

150 billion standard cubic meters of natural gas were flared in 2019 by the oil and gas industry globally, equivalent to a total rate of 14.5 billion standard cubic feet per day. If burned in a gas turbine of typical efficiency (30-40%), this gas could produce a total electrical supply of 65 Gigawatts of electricity, the same as the peak electricity demand in the whole United Kingdom, or all the world's data centers and Bitcoin mining operations with 20 Gigawatts to spare.

With the advent of 'Industry 4.0' the demand for all kinds of data collection, processing, validation and integrity checking is likely to continue to increase exponentially.

> *"Ending routine gas flaring is a key component of our climate change mitigation agenda, and the global flaring reduction Initiative we launched just three years ago now has 77 endorsers, covering about 60 percent of the total gas flared around the world"* - Riccardo Puliti. World Bank Senior Director

Reducing flared emissions is a key part of the UN's Climate Change Agenda.

However conventional means of capturing and utilizing this gas are expensive and technically complex, yielding marginal returns, making it challenging for operators and stakeholders to agree upon investment in the necessary infrastructure in order to realise the UN's stated goals. A new perspective and business model are required to match the growth of Industry 4.0 with the demands to reduce climate change and increase the effectiveness of allocation of finite resources.

A New Operating Policy for Spaceship Earth

Buckminster Fuller [4] [5] described automation as a process similar to biological evolution, driven by the same fundamental forces of long-term species existential adaptation.

Organic systems evolve in such a way as to minimize and contain the transportation and processing of physical matter, while expanding the data and signaling systems, such as the endocrine and nervous systems, globally across the whole body. Biological evolution has been very good at minimizing the transport of physical matter around the body (limited to the digestive, respiratory, blood and lymph circulation), while maximizing the benefit of a global chemical and electrical signaling system with associated data processing (the endocrine and central nervous system with brain and the five senses). Thus, each cell and each organ can act in union, in homeostasis, while at the same time separating physical concerns, redundancy and firewalls between systems, limiting the transport of atoms to the scale at which they are most efficient and effective (within organs, within cells, organelles and cell nuclei) while at the same time reacting to and processing and wide variety of external stimuli.

The same biological principle is expressed in economic terms as 'glocalization' whereby physical goods are manufactured locally, as close to the energy source, the raw materials and the consumer as possible, while still maintaining the technological benefits of a global financial and insurance system, which acts to signal and process data with respect where resources should be deployed globally.

These two concepts (one biological, one policy-driven) can be seen as a public demand for the same sort of public good.

Short Circuiting the Wires of Progress

Our Web 2.0 data systems have worked in some ways, but failed in others and probably failed, overall, to live up their initial promise. We believe that Jaron Lanier captures the essence of this failure in his 2013 synopsis 'Who Owns the Future' [3].

Likewise the 2008 financial crisis laid bare the failures of international finance and national regulators to make the financial system both efficient and effective at capital allocation. Therefore, while our financial system and information technology networks have evolved to be global, the 'organism' as a whole has not yet evolved to act in synchronization, in homeostasis.

The emergence of Bitcoin, other cryptocurrencies and decentralized smart contract execution platforms such as Ethereum and RChain, where nodes contribute to the network via a trustless proof algorithm (Proof of Work or Proof of Stake) and where 'Oracles' are autonomously sought and paid to prove the integrity of data on the network, can be viewed in terms of evolution of our data networks seeking to validate and verify their own effectiveness. The Bitcoin price and the Ethereum price can be viewed as a proxy for the public demand for both the synergy and integrity data and financial networks.

The 'hash rate' of the Bitcoin network is currently many hundreds of times larger than all the world's supercomputers combined. Metcalfe Energy believes this to demonstrate an enormous public demand for our most important data to exhibit high integrity and high effectiveness. The Bitcoin blockchain is publicly accessible to all for the cost of a few dollars per transaction but is underwritten and verified by hundreds of times more raw number crunching power than the world has ever previously seen, all competing to maintain the integrity of this data.

While Bitcoin is a beacon of network integrity, likewise the flaring of fossil fuel, a product for which there is always some demand and which forms the underlying basis for a great deal of economic activity from chemical manufacture to transportation, is a signal and a beacon of a physically manifest economic failure. There are often no technological, scientific nor often commercial barriers to the utilization of hydrocarbons other than the ability to form trust and consensus across multiple parties, to validate the economic network to act in a trustworthy and predictable way.

Integrating the aforementioned principles the use of flared and wasted fossil fuel to mine Bitcoin in situ can be viewed both as a desire for a market inefficiency to be met with a network of trust, and for Bitcoin to be operating as a proxy for a trusted or commercially viable physical infrastructure network in the absence of one.

Likewise, the use of hydrocarbons to mine Bitcoin in situ can be viewed as a more biologically effective and sustainable use of resources, containing the transportation and exothermic chemistry of physical matter within its own necessary confines, within its own cell wall, to power the 'ATP cycle' for a global high integrity financial data integrity validation network.

Mining Bitcoin with flare gas can seem, on the surface, to be an extension of ineffective and predatory capitalism, seeking profit only, when in actuality we believe that this business model is short circuiting the

wires of progress, connecting the public demand for sustainable and effective resource allocation where it is priced in most accurate way, with a supply of the most poorly allocated essential economic resources, most symptomatic of the problems that high integrity networked financial data solves.

Following this vision and this basis of understanding within this new industry, based on a set of solid fundamentals and principles as opposed to processes and KPIs, Metcalfe Energy can remain agile and take advantage of market opportunities as opposed to being fixed to a single business model and a single set of business processes.

V. RChain

Proof of Stake radically changes the blockchain opportunity space because tokens are not allocated via the power of hardware running the Proof of Work algorithm, but rather according to the rules set down by the governance structure of the Proof of Stake DAG itself.

So far these 'staking tokens' have been issued via direct exchange from ICOs on the Ethereum blockchain, or via venture capital investment. But the code associated with these Proof of Stake DAG solutions is open source, allowing anyone to clone their network architecture and distribute tokens according to the value systems of their own network.

New value networks are required in order to achieve the levels of genuine innovation necessary for mankind to achieve both a high quality of life and live that life in harmony with our environment and each other.

While Bitcoin and Ethereum have had some measured success in disrupting global finance, if we consider the total market capitalisation of Bitcoin ($1trillion) relative to the total market capitalisation of the global financial derivatives market ($500 trillion) it is 500 times smaller.

Decentralised finance is beginning to emerge on the Ethereum blockchain but is limited by the inherent problems with the Solidity smart contracting language, which is not safe by construction and typically requires 40 hours of quality assurance per line of code deployed to the main net. This QA burden escalates exponentially with complexity which fundamentally throttles the possibility space of Solidity-based smart contracts. Despite being ostensibly 'Turing Complete', token standards such as ERC-20 and ERC-721 only represent receipts or bearer tokens and not even simple metadata such as signed documents or pictures can be stored on the Ethereum blockchain at scale.

RChain technology radically changes the blockchain and cryptocurrency industry landscape for the following reasons:

1) The Rholang smart contracting language is safe by construction, which means code runs as intended in production. This radically reduces the quality assurance burden of deploying smart contracts into production.

2) The Rholang smart contracting language is inherently parallel which means that consensus can be achieved in parallel throughout the DAG. This allows for multiple tens of thousands of transactions per second to be processed on the DAG, compared to 4-8 transactions per second on the Bitcoin blockchain.

3) The RChain R-Space data storage facility allows for complex large files to be stored on chain at scale. Rather than storing strings as pointers to centralised data storage, as happens on Ethereum, RChain can store pictures, pdf files and even Git repos.

4) The RChain Co-Operative's shard isn't a monopoly over the technology itself, which is open source. The Mercury release of RChain provides an opportunity for new entrants with their own unique governance structures, economic models and social values while the next release, Venus, is developed. This creates a three year window of opportunity.

While the RChain Cooperative has had some impressive characters within its ranks, many left due documented governance problems and scandals including but not limited to:

1) RSong as alleged exit scam
2) Tokens sold for counterfeit cash
3) Involvement and connection with felons and known scam artists
4) Run ins with Washington State financial regulators
5) Poor treatment of ecosystem developers, causing many to leave the project altogether
6) Founders' Syndrome around the CEO Greg Meredith who is known to unilaterally railroad CoOp time and resources

RChain CoOperative keeps a treasury of tokens (circa 40% of the outstanding float) in order to fund further development. But without a clear publicly available development roadmap and with legacy problems burdening the project it is difficult to ascertain the

value of the treasury knowing that 40% of the float is controlled by a tainted governance structure.

Learning from the experiences of RChain CoOp and improving upon them with a transparent and clear vision creates an opportunity to do things differently.

RChain Token

RChain-Token is a token or asset management smart contract for the rholang and RChain ecosystem. It can deal with fungibles as well as non-fungibles tokens. It is similar to ethereum's ERC20, or ERC1155 except that it relies on the OCAP (object capabilities) [89] philosophy.

This paradigm is the most efficient and simple way to express ownership and permissions. Ownership and/or permissions may only be expressed by the ownership of an object that makes sense in the context of the contract, you may call this object a purse or a key. For example: if you have a key to a car, you're the only one that will be able to drive it. When a seller issues a car, he will not issue a service checking your identity before you enter and drive, the person either has the right key or does not have it. It all seems logical but many permission and identity systems have been built with a classical signature/authentication approach, which is not inherently bad, but brings its own limitations and frictions.

RChain-Token also proposes extended capabilities, such as public data association: you may want to associate data to your key or purse, and people or other rholang programs may make use of this data (for voting, for example). Another key capability is REV exchange, ERC tokens require you to go to an exchange to trade your tokens against ETH or other tokens, RChain-Tokens embed a simple exchange system by default, whereby owners may set their items/tokens for sale, and people may purchase those items with REV according to the price that has been set by the owner.

This simple decentralized exchange would only deal in RChain's native currency REV, not a swap system, nor buy/sell platform.

VI. Blockchain Governance

Governance structures for Proof of Work blockchains rely mostly upon fixes and updates to the code run by each node of the network. The Proof of Work algorithm itself is responsible for issuing new tokens. On Ethereum this has been expanded to include 'Ethereum Request for Comments' or 'ERC' standards via an 'Ethereum Improvement Proposal' whereby newly proposed smart contracts are reviewed and approved.

Proof of Stake introduces new important governance issues:

1) Initial staking token distribution

2) Staking token treasury management

3) Casper consensus constraint setting

4) Staking economic incentive setting

This makes the human element of blockchain governance much more important in Proof of Stake systems than Proof of Work systems. For Bitcoin, for example, the mining economics were all encoded from the beginning and any changes require a hard fork by a group of miners. Proof of Stake inherently invokes the processes of human governance, whether autocratic or democratic, and are therefore open to all the same vectors of hacking and subversion that our normal social systems are. While more efficient and more scalable, Proof of Stake blockchain solutions are also more centralised than Proof of Work blockchains in terms of the governance and the human aspect.

It is therefore vital that all Proof of Stake blockchain governance structures have a clear vision, which is what this paper aims to present.

VII. Harnessing Collective Intelligence

In a perfect world, money represents the synergy of a virtuous circle of finance, insurance and engineering [6] [7] [8]. Within this paradigm of understanding finance exists purely as a technology that retains the capital produced by engineers to an insurable standard in order to be able to produce more engineering to an insurable standard. Therefore money is merely a product of high quality human productivity and the interest rate is a product of the availability of surplus capital produced by insurable engineering.

Finance
Insurance
Engineering
1. Bank will not Lend Money unless asset is insured
2. Insurance Company will not insure asset unless it is properly engineered
3. Proper engineering must be financed (cover soft cost)

Figure 7.1: The virtuous circle of engineering, insurance and finance.

Insurance represents the cost of risk mitigation at scale according to best available data and predictive capability.

In order to produce general innovation across society commensurate with the blockchain revolution in finance it makes sense to expand blockchain's functionality to include more than just finance.

Augur and Gnosis [46] [47] begin to break into decentralised insurance by offering peer to peer betting markets. This helps to reveal the best available predictive capability of global human society and also allows people to profit from their personal information rather than allowing it to be sequestered by a Siren Server [3] [50].

The integration of blockchain technology with engineering has, until now, remained an elusive goal. This paper, in its full three parts, aims to build upon existing understanding of blockchains and Patrick Mockridge's previous experience with the Integrated Engineering Blockchain Consortium to demonstrate an actionable and product-focussed high impact vision that brings the power of blockchain technology into the sphere of engineering and blue collar labour.

VIII. Conclusion

While humanity's current predicament appears precarious the technology and the intellectual framework both exist within which radical change can be facilitated. Blockchain technology, and especially RChain, represents a novel opportunity to model human interaction at the technocratic level, without technocratic corruption, to the necessary level of refinement to give genuine meaning and genuine purpose to the lives of not just engineers but ordinary people as well.

The key to unlocking the power of Proof of Stake Casper Consensus blockchains is in getting the governance right. Proof of Stake sacrifices the reliability of Proof of Work consensus for human centric governance in order to achieve greater efficiency and performance. The economics and costs dictate that Proof of Stake blockchains will support a greater proportion of transaction volume in future. This means that the purpose and telos of blockchain governance must be framed correctly in order to tackle the root of the problems that humanity faces today if blockchain is to achieve its stated goals of optimised decentralisation.

Parts two and three of this paper will present a governance framework that can achieve the 'Great Reset' goals stated by the World Economic Forum.

While Bitcoin's market capitalisation is currently over $1 trillion, this represents between 0.1 and 0.2% of the value of all financial derivatives globally and roughly 0.3% of global debt [60] [61]. In order for blockchain to compete with the global value monopoly it needs to empower ordinary people at scale. This paper sets out an agenda and a path from a $1 trillion blockchain industry focused purely on financial and insurance use cases to a $500 trillion blockchain industry that is as flexible as people's lives and situations are unique.

This new vision, encompassing engineering quality assurance; universal ownership of the autonomous means of production; universal competency-based self-sovereign digital identity; universal access to engineering simulation and white noise filters for individual creatives to protect themselves from Siren Server data sequestration we term **Syngenegraph**.

Syngenegraph is a portmanteau of three words:

- Synergy: in that the whole is greater than the sum of the parts.
- Generate: in that the whole purpose is to equip as many people as possible to be able to build and create.
- Graph: in that people can plot and map where they are in relation to where they want to be relative to society and their own creative and personal goals as accurately as possible.

IX. References

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